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DINOSAURS!

•DISCOVER THE GIANTS OF THE PREHISTORIC WORLD•

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IDENTIKIT

Learn to identify three more dinosaurs
HYPACROSAURUS 649
STAURIKOSAURUS 652
TITANOSAURUS 653

DINOSAUR WORLD

Find out about the dinosaurs
ON TOP OF THE WORLD 654

SPOTTER'S GUIDE

Lend an ear to
EARS AND HEARING 662

TIME DETECTIVE

Add skin to muscle to make
DINOSAURS IN THE FLESH 664
Scientists MAKING MISTAKES 666

HISTORY IN PICTURES

GENEROUS UNCLE GEORGE 668

A to Z

Move from the Ls to the Ms: *Lukousaurus* through to *Macrurosaurus* 672

ASK THE EXPERT

Test Dr David Norman's knowledge BACK COVER

PLUS

GIANTS OF THE PAST

Hypacrosaurus tries to hide from hungry *T rex* 658

3-D Gallery

Maiasaura comes to life in fabulous 3-D 660

DINO Fact File

Amaze your friends with more fantastic facts 670

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HYPACROSAURUS

***Hypacrosaurus* was a large duckbilled dinosaur. With its tail stretched out, it was almost as long as a bus.**

Hypacrosaurus had nothing to defend itself with if it was attacked. So it was constantly on its guard against predators such as the fearsome meat-eater *Tyrannosaurus rex*.

BASEBALL CAP

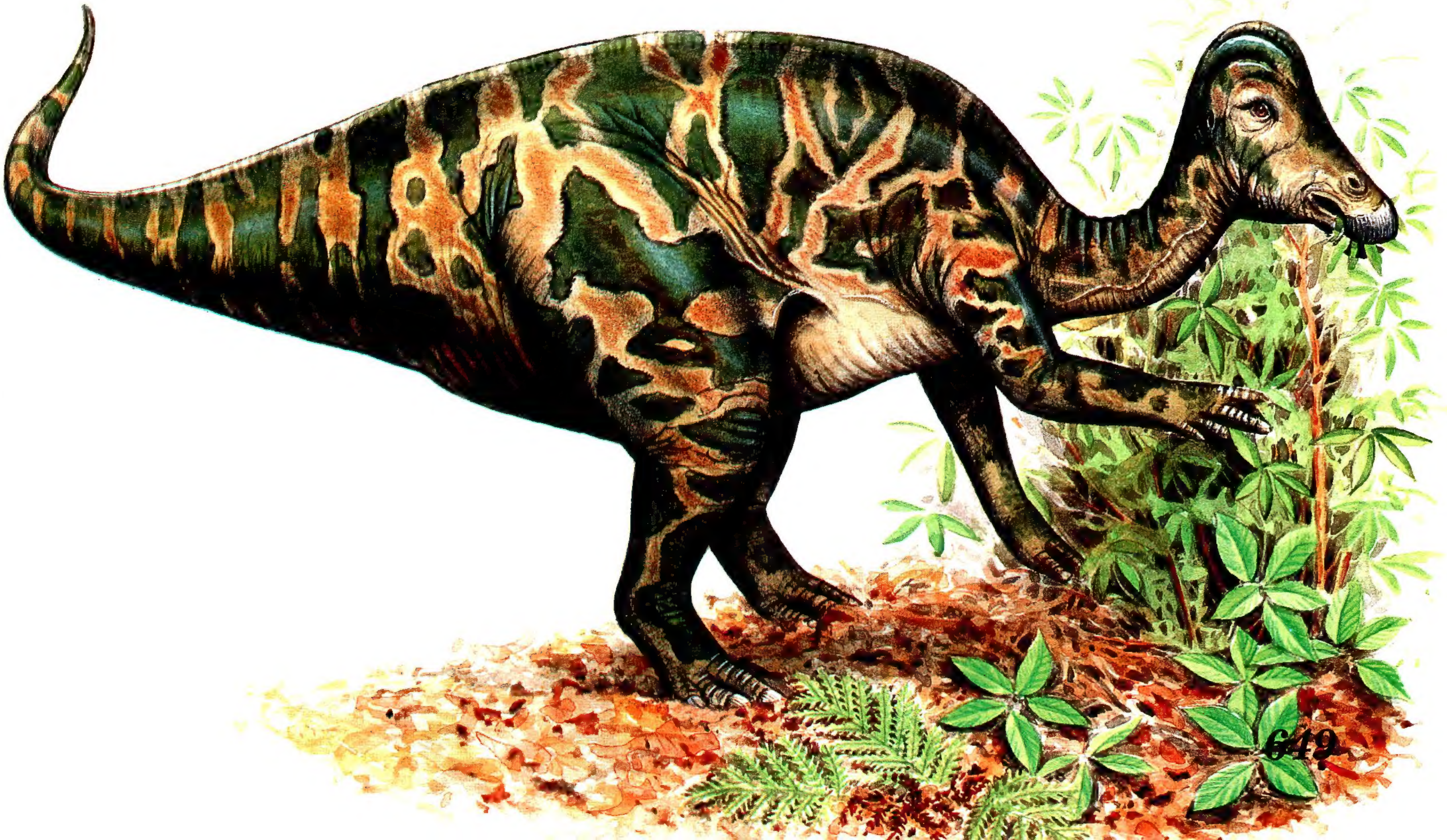
Hypacrosaurus had a helmet-shaped bony crest like its relative *Corythosaurus,* but it was lower and wider. The crest grew out from the bones at the front of the skull and had the rounded shape of a baseball cap. *Hypacrosaurus'* whole skull was about as long as two rabbits lying nose to tail.

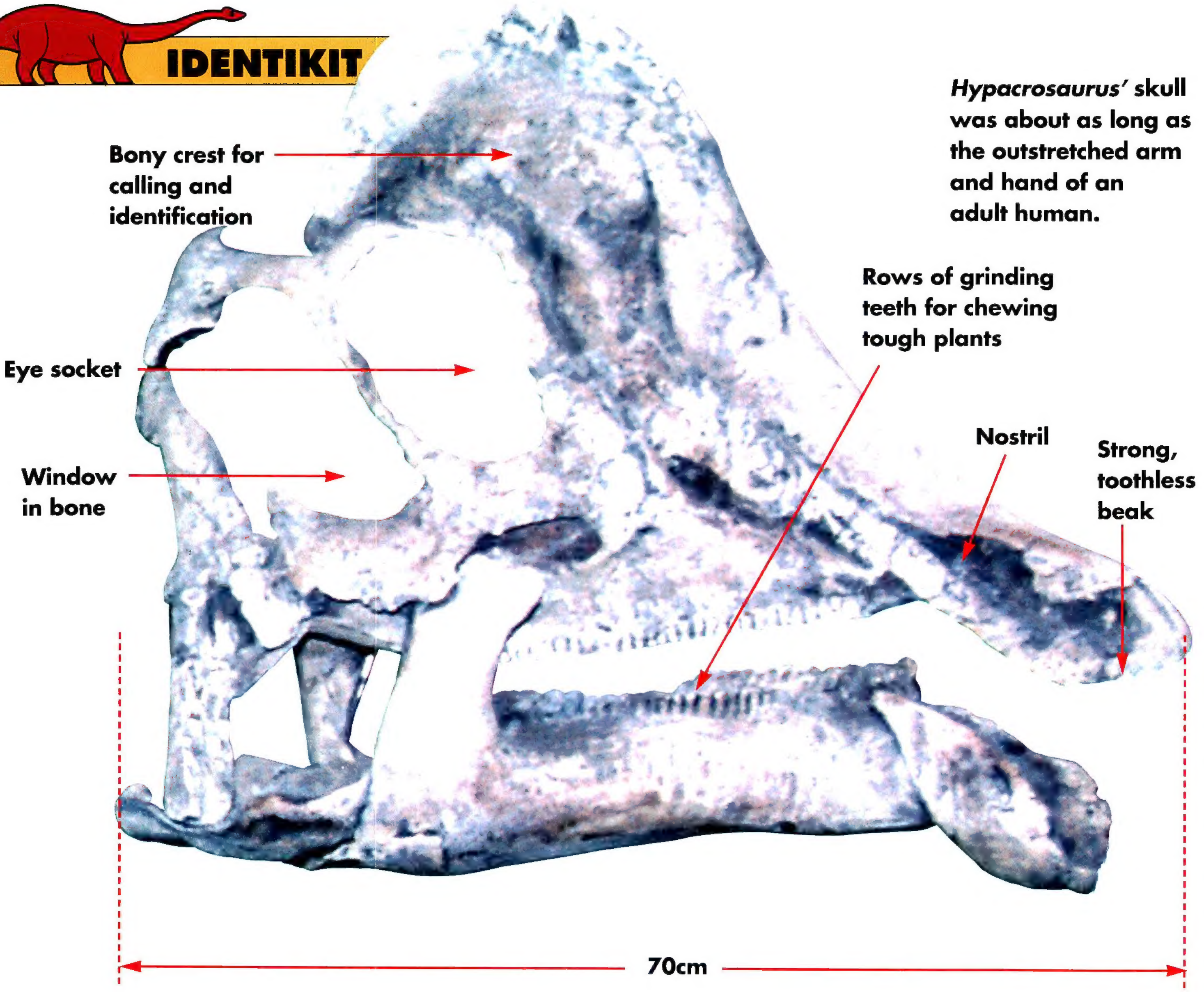
GOOD SENSES

Hypacrosaurus liked to eat crunchy pine needles and fir cones. It usually stood on all fours as it browsed around the forest, nipping off the tough vegetation with its strong, toothless beak. But danger always lurked in the shadows, and *Hypacrosaurus* relied on its sharp senses to give it advance warning of trouble.

HEAD DOWN, TAIL UP

If *Hypacrosaurus* was frightened, its best hope was to run away from the predator as quickly as possible. With its head held low and its stiff tail held out behind for balance, it made its escape on two powerful back legs.




Bony crest for calling and identification
Eye socket
Window in bone
Rows of grinding teeth for chewing tough plants
Nostril
Strong, toothless beak
70cm

***Hypacrosaurus'* skull was about as long as the outstretched arm and hand of an adult human.**

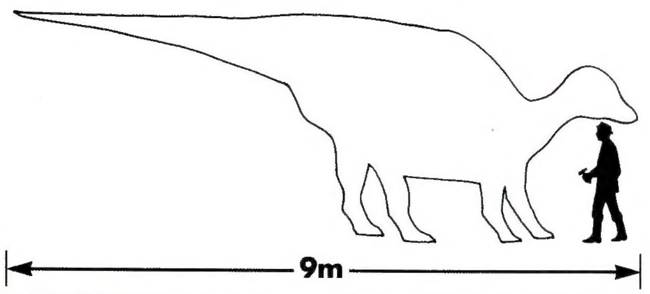
CALLING CREST

Scientists believe that crested dinosaurs made their own special calls. The shape of their crests gave each dinosaur a different sound, like instruments in a brass band.

WHO'S CALLING?

Trumpets and tubas don't sound the same. If another dinosaur heard *Hypacrosaurus* hoot or bellow it could probably tell what was making all the noise!

SIZE WISE



MONSTER FACTS

- **NAME:** *Hypacrosaurus* (hi-pak-ro-saw-rus)
- **SIZE:** about 9m long
- **FOOD:** plants
- **LIVED:** about 75 million years ago in the Late Cretaceous Period in Canada and the USA

MATING SIGNAL

Hypacrosaurus may have used its head crest to attract a mate. The special shape of its head helped other members of the same dinosaur family to recognise it easily. Scientists believe that females probably had smaller crests than males.

LAND LOVER

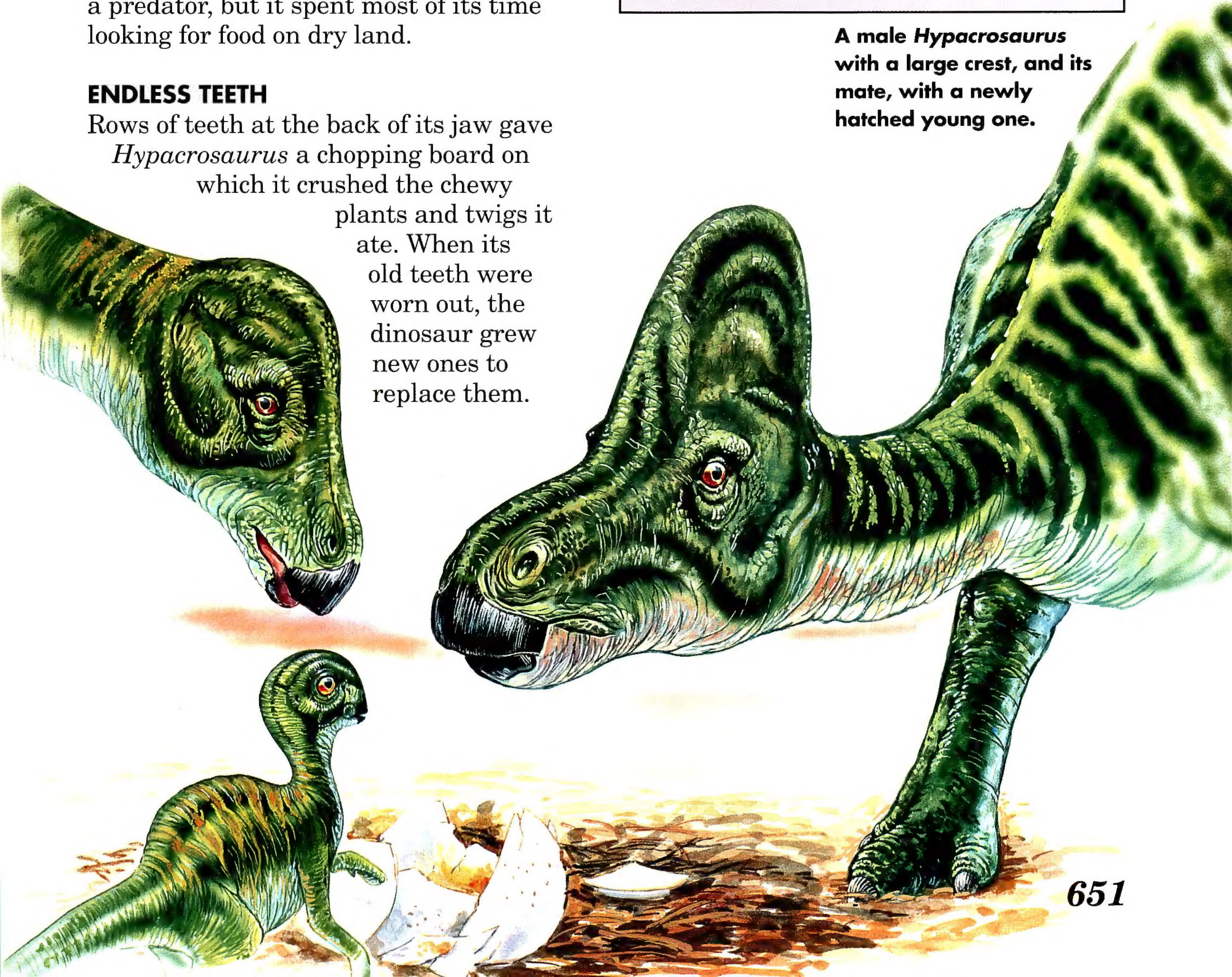
At one time scientists thought that duckbilled dinosaurs spent a lot of time in water, feeding on soft water plants. But when they studied the fossilized contents of duckbills' stomachs they found that they ate tougher food. *Hypacrosaurus* may have plunged into water occasionally to escape a predator, but it spent most of its time looking for food on dry land.

ENDLESS TEETH

Rows of teeth at the back of its jaw gave *Hypacrosaurus* a chopping board on which it crushed the chewy plants and twigs it ate. When its old teeth were worn out, the dinosaur grew new ones to replace them.

Is it true that some dinosaurs have two names?

Dinosaur names are invented by palaeontologists. Sometimes scientists mistake an old dinosaur for a new one. This happened when some skeletons were found in the 1940s which looked like *Hypacrosaurus*, but had smaller skulls. They were named *Cheneosaurus*. Thirty years later experts realised that these skeletons were, in fact, young *Hypacrosaurus*. The skulls were smaller because they were not fully grown and their crests had not developed fully. The name *Brontosaurus* is no longer used for the same reason. The bones given that name turned out to be the same as some that had been named *Apatosaurus* earlier.



A male *Hypacrosaurus* with a large crest, and its mate, with a newly hatched young one.

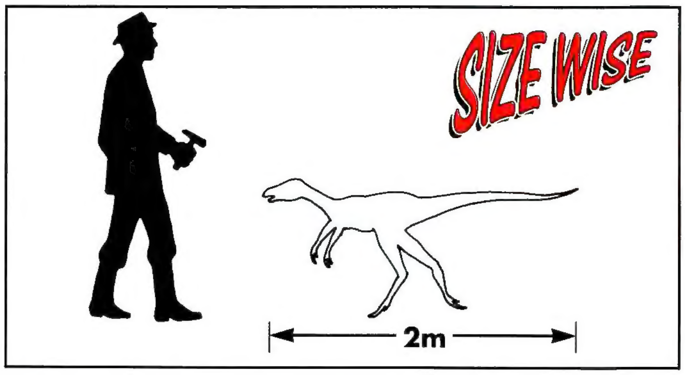
STAURIKOSAURUS

Fast-moving *Staurikosaurus* was one of the earliest dinosaurs.

Staurikosaurus was a dangerous hunter. It was able to chase and kill much bigger prey, although it was lightly built and only about as long as a large dog.

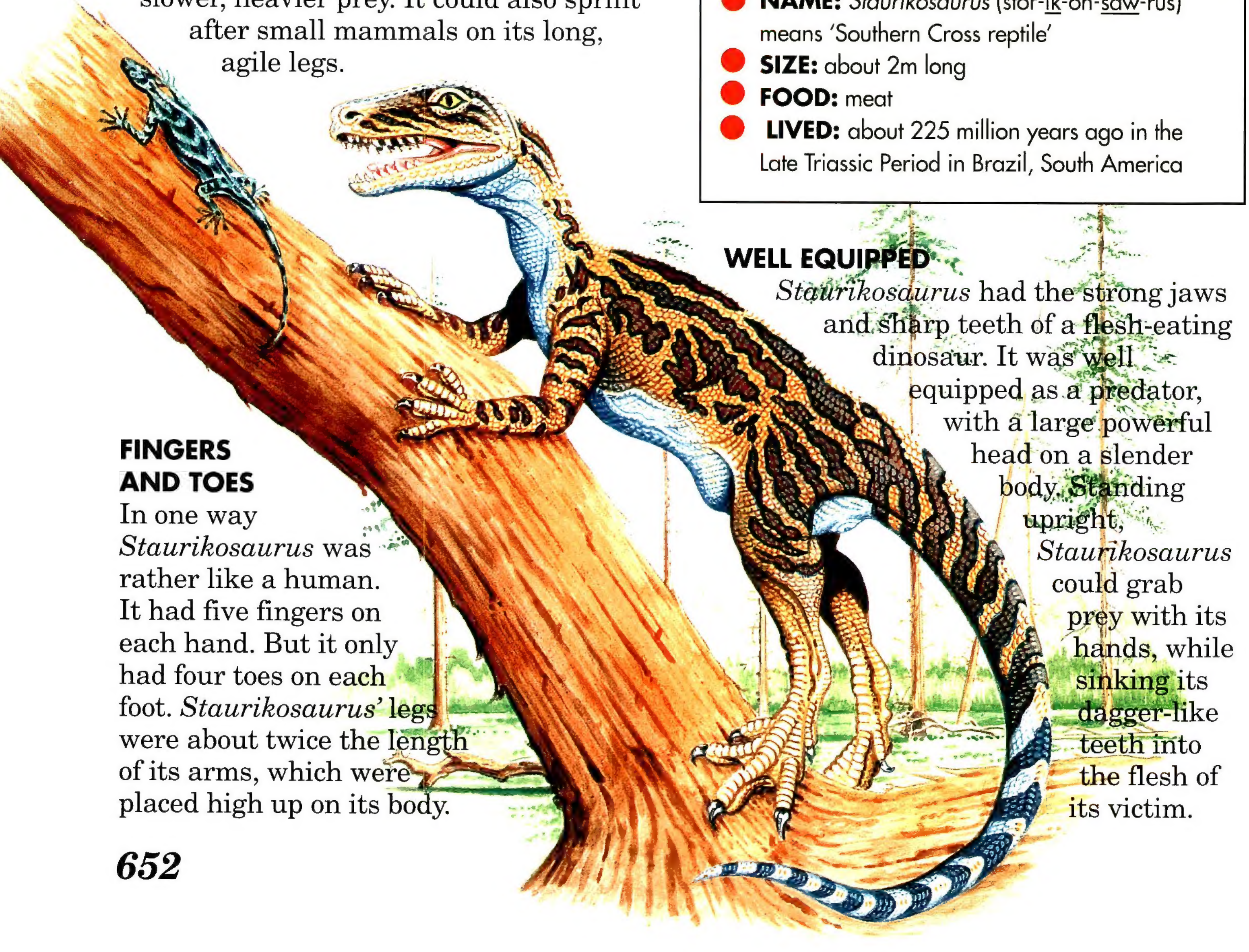
DAINTY BONES

Staurikosaurus was a lightweight dinosaur, weighing only about 30kg. Its dainty frame gave it an advantage over slower, heavier prey. It could also sprint after small mammals on its long, agile legs.



MONSTER FACTS

- **NAME:** *Staurikosaurus* (stor-ik-oh-saw-rus) means 'Southern Cross reptile'
- **SIZE:** about 2m long
- **FOOD:** meat
- **LIVED:** about 225 million years ago in the Late Triassic Period in Brazil, South America



FINGERS AND TOES

In one way *Staurikosaurus* was rather like a human. It had five fingers on each hand. But it only had four toes on each foot. *Staurikosaurus'* legs were about twice the length of its arms, which were placed high up on its body.

WELL EQUIPPED

Staurikosaurus had the strong jaws and sharp teeth of a flesh-eating dinosaur. It was well equipped as a predator, with a large powerful head on a slender body. Standing upright, *Staurikosaurus* could grab prey with its hands, while sinking its dagger-like teeth into the flesh of its victim.

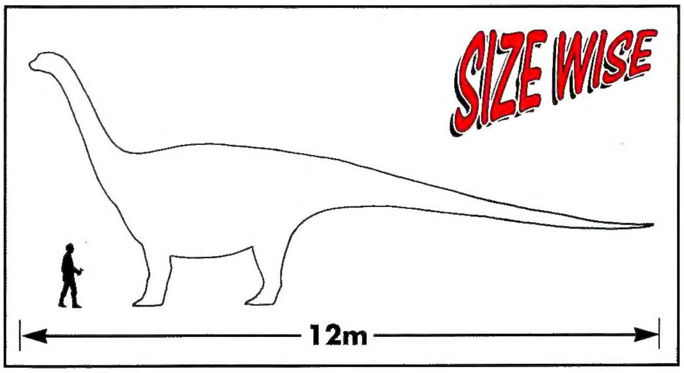
TITANOSAURUS

***Titanosaurus* was three times the height of an average human and as long as the net across a tennis court.**

Large, plant-eating *Titanosaurus* was first found in India more than 100 years ago. Only a few fragments of its skeleton remained.

ARMOUR-PLATING

Forty years later scientists realised that the bony armour found nearby also belonged to *Titanosaurus*. This exciting discovery meant that, like *Saltasaurus*, *Titanosaurus* probably had bony armour-plates scattered across its broad back.

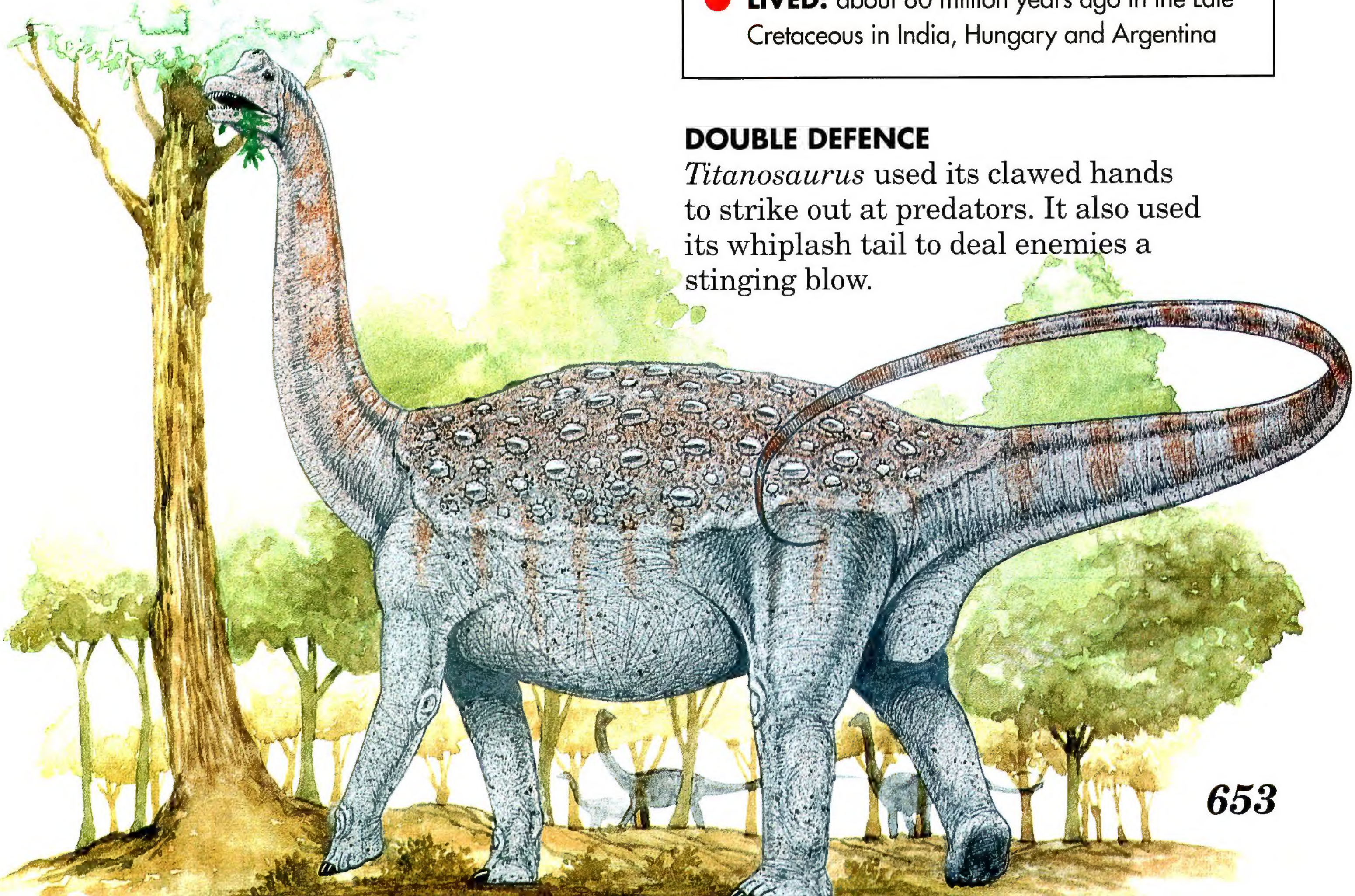


MONSTER FACTS

- **NAME:** *Titanosaurus* (tie-tan-oh-saw-rus) means 'titanic reptile'
- **SIZE:** about 12m long
- **FOOD:** plants
- **LIVED:** about 80 million years ago in the Late Cretaceous in India, Hungary and Argentina

DOUBLE DEFENCE

Titanosaurus used its clawed hands to strike out at predators. It also used its whiplash tail to deal enemies a stinging blow.



On top of the world

Which dinosaurs lived in the prehistoric highlands?

Uplands are brilliant places for seeing scenery. As you walk from the lowland plains and valleys into the foothills, you see the countryside stretching far away below you. Higher still, in the true mountains, the land lies below like a real-life map.

A male chamois (right) is an upland animal of today.

UP AND DOWN

Today it is generally too cool for reptiles in the uplands. But millions of years ago the world was warmer, so some dinosaurs may have lived in upland areas. Or they may have travelled there for the summer, like the agile, goat-like chamois does today.

FORERUNNER OF THE GIANTS

Rocks containing fossils of the dinosaur *Anchisaurus,* with other animal and plant fossils, suggest it was an upland-dweller. It was a forerunner of *Diplodocus*, which lived in the Early Jurassic in North America. Close relatives have been found in southern Africa. These places are separated by a vast sea now. But at the time all the continents were joined.

Dilophosaurus **(left) may have preyed on smaller** ***Thecodontosaurus*** **in the Jurassic uplands.**

IT'S A FACT

THAT FOSSILS CAN LIE

Experts judge the age of a fossil partly by the age of the rocks in which they find it. But that can be misleading. Imagine an upland dinosaur fleeing from a predator. It falls into a deep crevice. At the bottom the rocks are much older. The dinosaur dies and the crevice fills up. When we dig out the fossils today, they are in rock much older than the dinosaur itself.

A TOUGH DIET

Anchisaurus was about 2m long. It had a long neck and tail, walked mainly on its hind legs, and gathered food with its hands. It was probably a plant-eater because it had blunt teeth and the huge stomach and long intestines needed to digest tough plants like the conifers and cycads that grew in dry, upland areas.

NO TIME FOR THE SCENERY

Animals of the uplands do not stand around admiring the view. They are too busy trying to survive. Uplands are cool places. As you go up, the temperature goes down. Even a few hundred metres makes a noticeable difference. They are also windy places. The higher you climb, the faster and harder the wind blows.

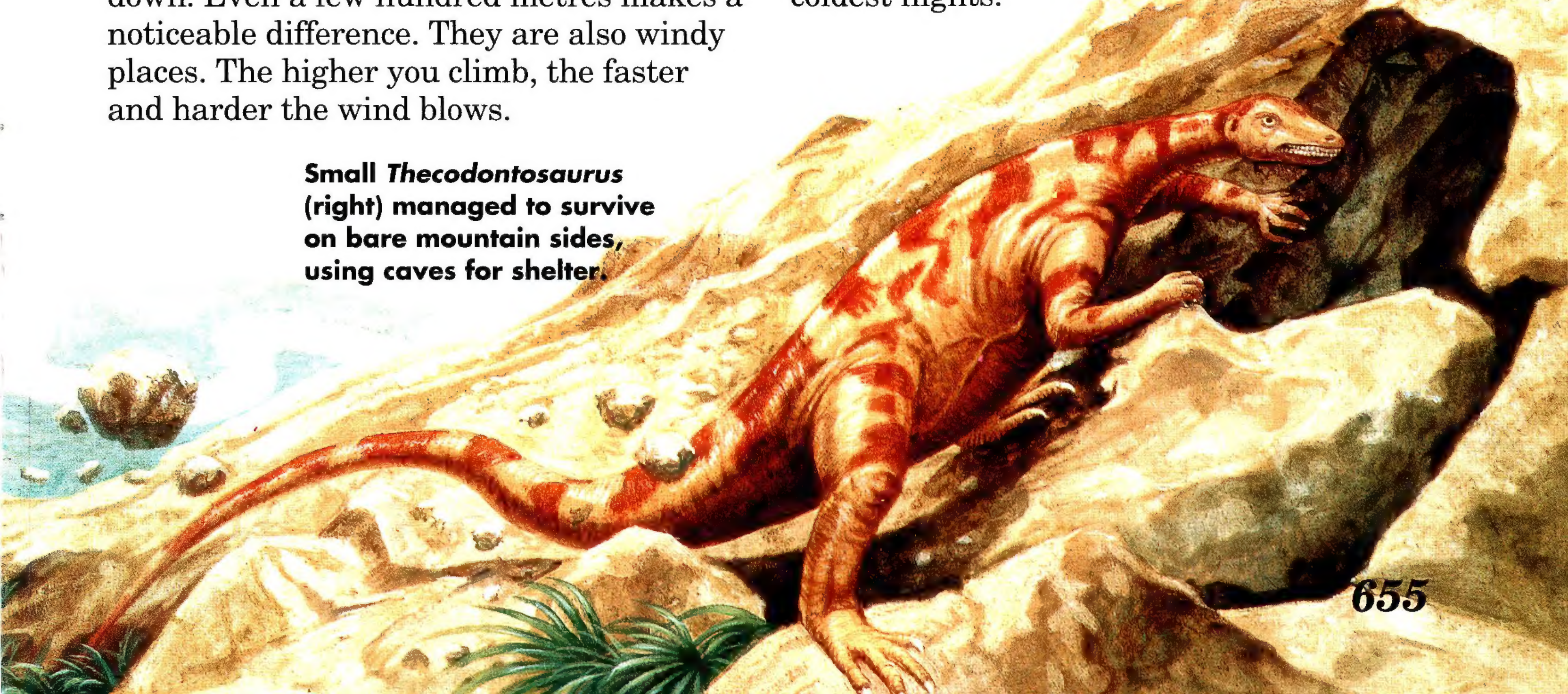
BARE ROCK

Uplands are often bare and rocky. As the slopes get steeper, rain and melting snow rush faster down them. The water washes away soil in its path. But uplands have an advantage too. As not many animals can live there, the ones that do have fewer competitors, and fewer predators.

Like some upland dinosaurs millions of years ago, today's cougar (right) uses a cave for shelter.

CAVE-DWELLING DINOSAURS

Fossils of *Thecodontosaurus,* another early dinosaur were found in gullies and caves in south-west England which were in limestone uplands millions of years ago. These small, short-necked dinosaurs may have lived in and around caves. Their food was thinly scattered plants, and caves sheltered them from the hot midday sun and the coldest nights.



Small *Thecodontosaurus* (right) managed to survive on bare mountain sides, using caves for shelter.

MAKING GUESSES

Guessing how dinosaurs lived and died by looking at fossils and rocks is very tricky. For instance, animals which are found buried in one place may have lived far away. When they died, rivers swollen by the rainy season carried the bodies long distances, down to the marshes. Many dinosaurs thought to live in lowlands may have really lived in uplands.

A *Stegoceras* parent (above), rushes headlong at *Arrhinoceratops* (top left), scaring it off.

GHOST GRAVEYARD

In 1881 fossil-hunter David Baldwin found some fragments of dinosaur fossils in a place called Ghost Ranch, in New Mexico, USA. From these scraps, the dinosaur expert Edward Cope named one of the earliest-ever dinosaurs – *Coelophysis*. In 1947, another expedition to Ghost Ranch found a wonderful dinosaur graveyard where a herd of adult and young *Coelophysis* had been buried together. Their fossils were piled on top of each other.

DIED IN THE FLOOD

Why were there so many *Coelophysis* fossils together? These speedy, two-legged dinosaurs may have hunted in packs. Evidence suggests they lived in upland forests, perhaps near rivers. A sudden rainstorm may have flooded the area and washed their bodies downstream, on to a riverbank where they were fossilized.

COMMON OR RARE?

Dry uplands are not ideal places for fossils to form. In this bare landscape dead animals are eaten quickly by scavengers, long before their remains can be fossilized. When only a few, incomplete fossils of a dinosaur are found, there could be two reasons. One is that the dinosaur was truly rare. Another is that it lived in places like the uplands where there was little chance of being fossilized.

What is? THE CLIMATE LIKE ON A MOUNTAIN

That depends where you are on the mountain. At the bottom the climate can be tropical – warm and moist. As you climb a mountain you notice that for every 150m that you climb, the temperature drops about 1°C. On the way up you will pass through temperate forests, then cooler conifer woods, to the uplands of alpine pasture. At the summit there is snow and ice, even in the summer.

A buzzard (left) prepares to eat its rabbit prey. Very little of the rabbit will be left to form fossils for the future.

NOT AS RARE AS THEY SEEM

Arrhinoceratops was a horned dinosaur like *Triceratops*. It was about 6m long and had a bony neck frill, and three horns on its face. It lived during the Late Cretaceous Period, 75 million years ago, in what is now Utah, USA. *Arrhinoceratops* fossils are not as common as fossils of its horned cousins. But these dinosaurs might have been just as plentiful as their relatives. Their bones were not preserved because they lived in upland areas, where remains are rarely fossilized.

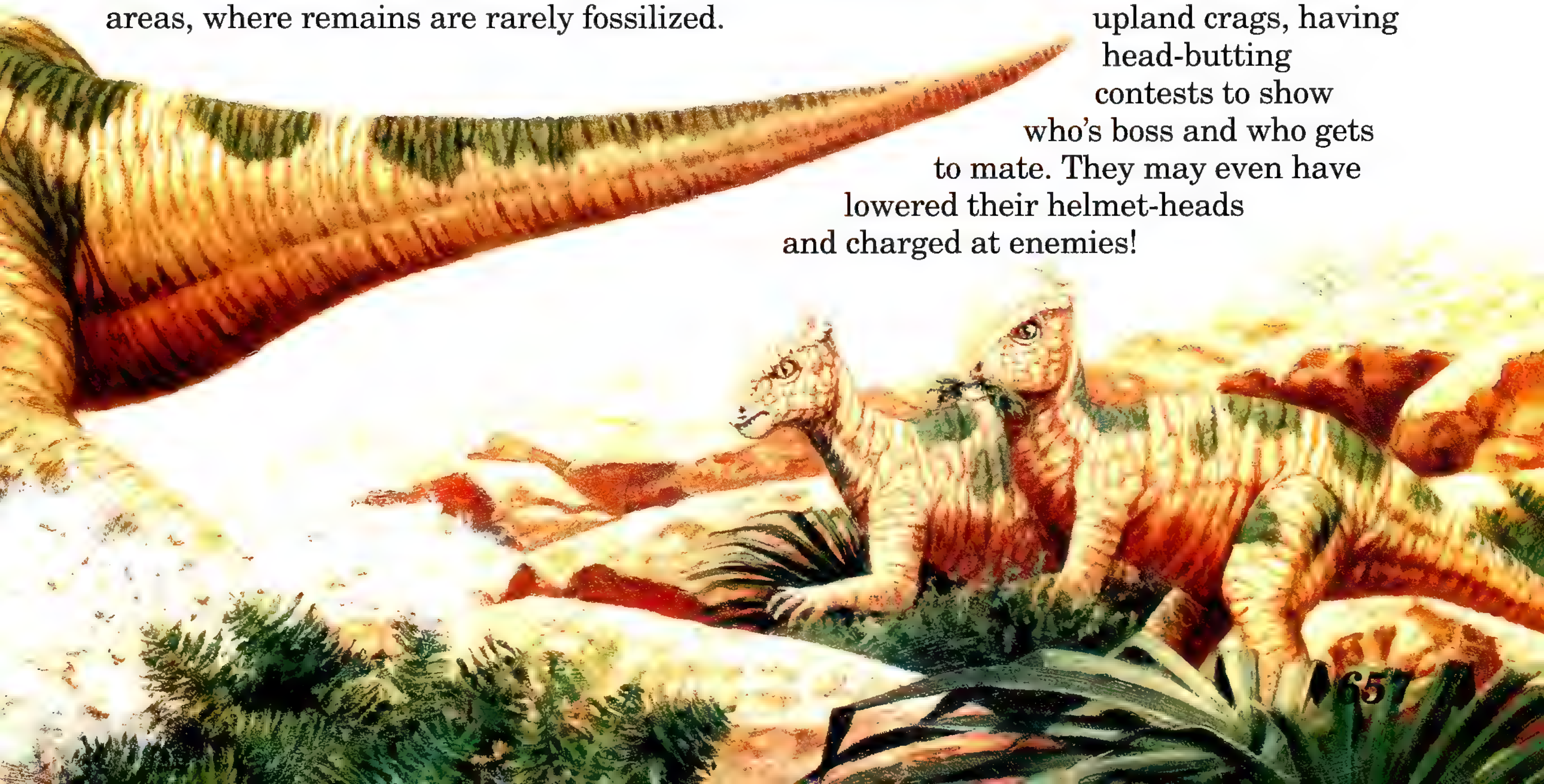
Two male Spanish ibex (above) lock horns in a ritual that is millions of years old.

THE THICK-HEADS

In the uplands today male mountain sheep and goats charge at each other, banging their horns and heads. They do this to see who is the strongest and can mate with the females. The horns and skulls of these animals are thick and strong, to absorb the knocks of head-butting. The skulls of pachycephalosaurs were similar, with a thick dome on top like a crash helmet.

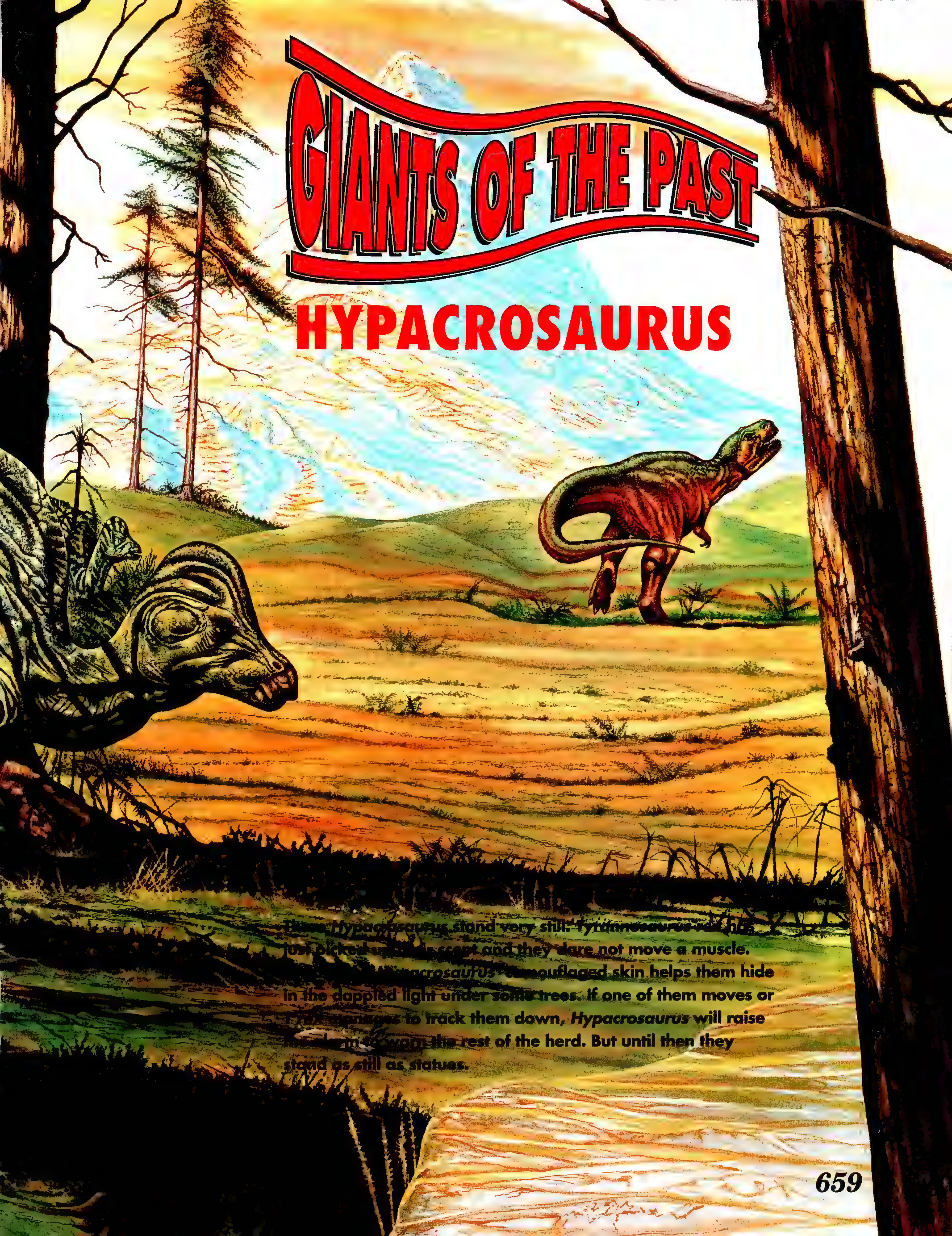
BUTTING TO BE BOSS

Stegoceras, a pachycephalosaur that lived 80 million years ago, was 2m long, ate plants, and ran on two legs. Imagine a small herd of *Stegoceras* living among the upland crags, having head-butting contests to show who's boss and who gets to mate. They may even have lowered their helmet-heads and charged at enemies!



GIANTS OF THE PAST

HYPACROSAURUS



These *Hypacrosaurus* stand very still. *Tyrannosaurus rex* has just picked up their scent and they dare not move a muscle. [illegible] *Hypacrosaurus'* camouflaged skin helps them hide in the dappled light under some trees. If one of them moves or *T. rex* manages to track them down, *Hypacrosaurus* will raise the alarm to warn the rest of the herd. But until then they stand as still as statues.

3-D Gallery 37

MAIASAURA

- A large hadrosaur
- Lived 90 – 66 million years ago in Montana, USA
- Measured 9m long
- Ate plants, fruits and seeds

Ears and hearing

Dinosaurs needed very sharp hearing. It helped them to find their prey and warned them of danger.

Dinosaurs did not have fleshy ears on the outside of their heads as you do. Like birds and lizards, they just had ear holes. Dinosaurs had small ear holes, which were close to where the head joined the neck.

EAR EVIDENCE

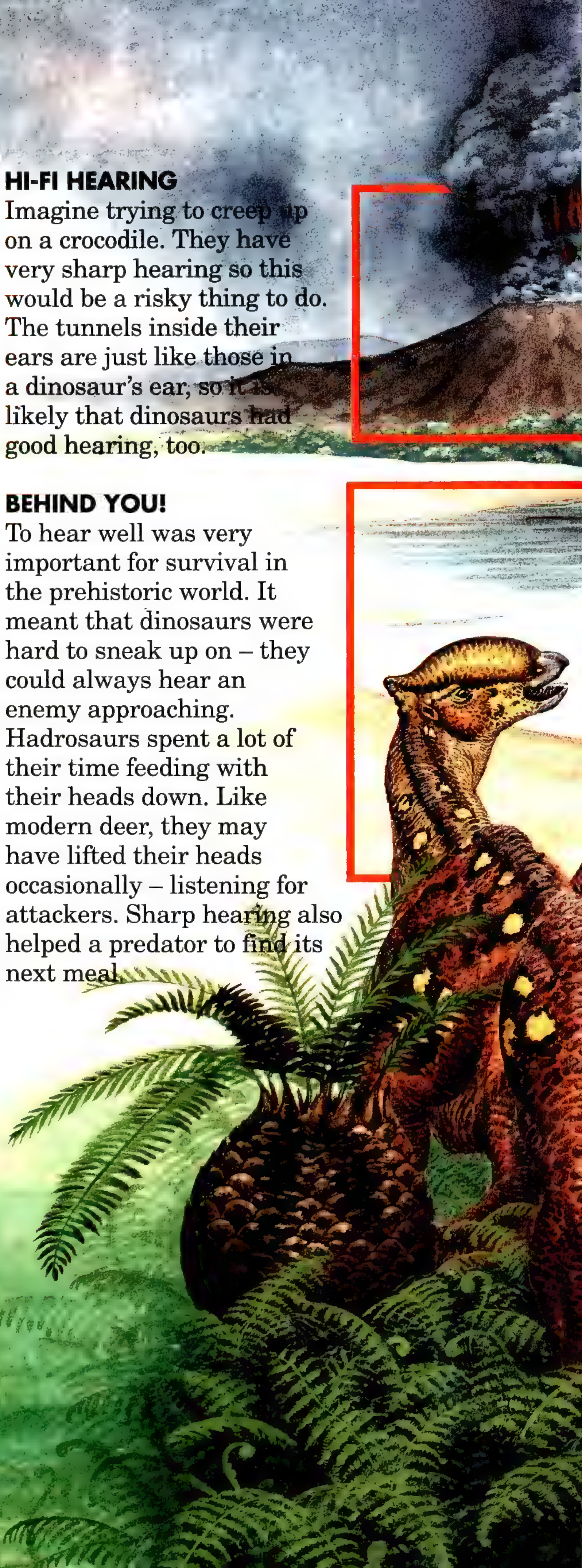
The fossils of some dinosaurs are so well preserved that scientists have been able to study the tiny bones inside their ears. From the evidence they have found, the scientists have worked out that dinosaurs could probably hear very well.

HI-FI HEARING

Imagine trying to creep up on a crocodile. They have very sharp hearing so this would be a risky thing to do. The tunnels inside their ears are just like those in a dinosaur's ear, so it is likely that dinosaurs had good hearing, too.

BEHIND YOU!

To hear well was very important for survival in the prehistoric world. It meant that dinosaurs were hard to sneak up on – they could always hear an enemy approaching. Hadrosaurs spent a lot of their time feeding with their heads down. Like modern deer, they may have lifted their heads occasionally – listening for attackers. Sharp hearing also helped a predator to find its next meal.



Is it true that some reptiles do not have ear drums, but can still hear?

Snakes do not have ear drums. They hear by picking up the vibrations that travel through the ground, and feel them through their jaws and heads. This is how they tell if another animal is near. A snake charmer's snake does not hear the music, and dance; it is watching and mimicking the movement of the charmer's pipe.

A volcano rumbles in the distance

A huge dragonfly whirrs by

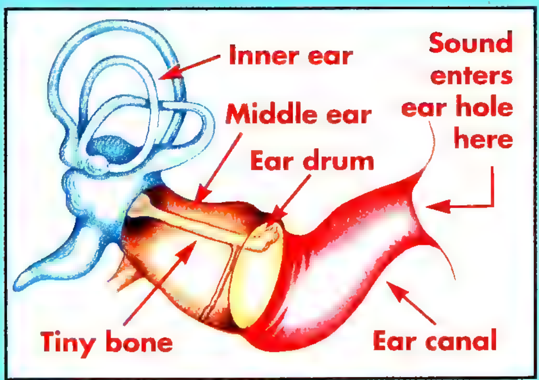
The thud of a hunter's footsteps

What have these two *Saurolophus* heard? They have stopped eating, lifted their heads and are listening hard. Sounds surround them: some noises are harmless, others are more dangerous. Which is the most frightening sound to these gentle plant-eaters?

HEARING MESSAGES

If hadrosaurs like *Saurolophus* heard a dangerous sound they called out a warning to other members of the herd. Hadrosaurs, such as *Parasaurolophus*, also called out at mating time. Dinosaurs must have been able to hear well to pick up these noisy messages.

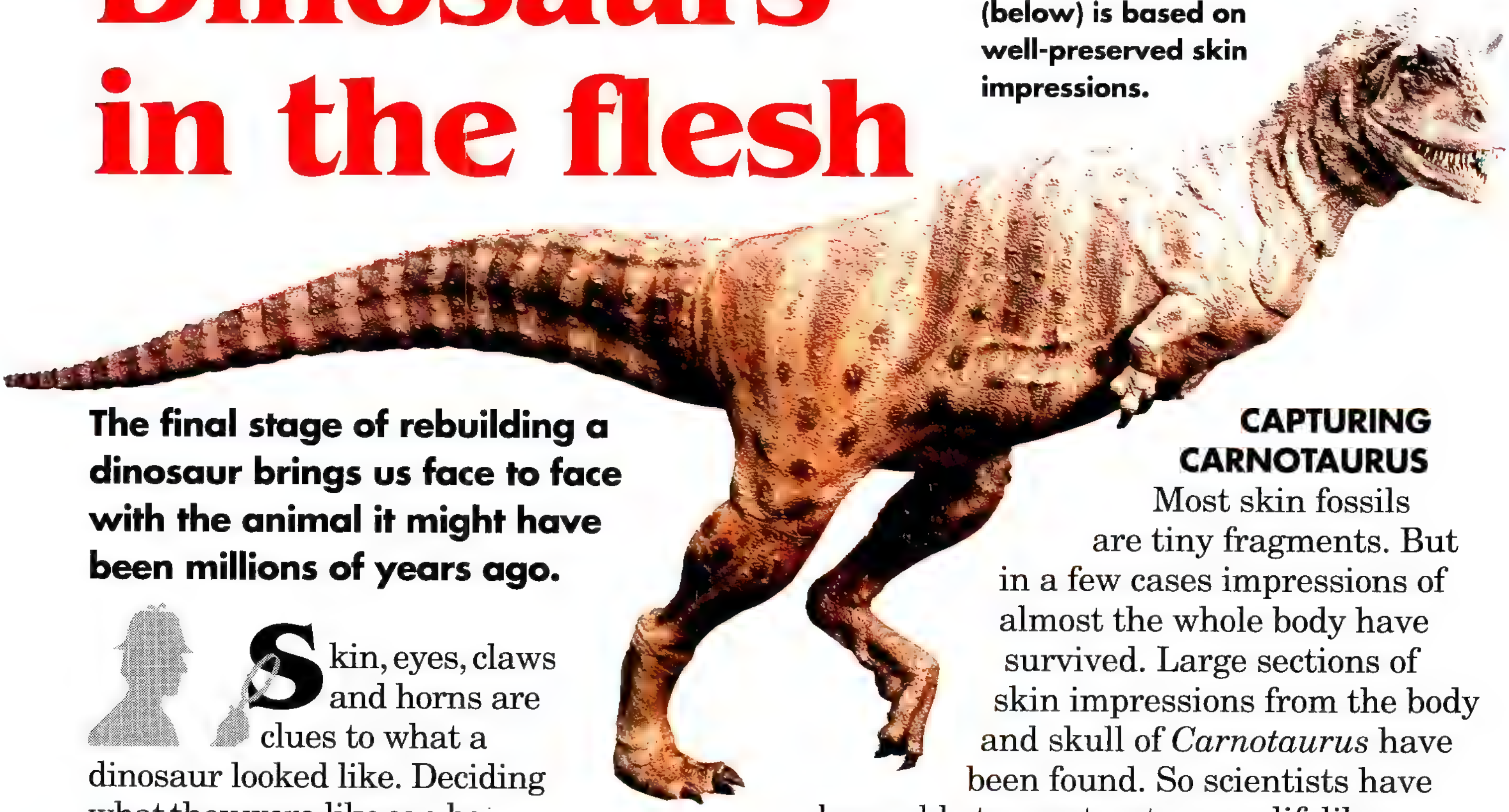
INSIDE AN EAR



This is the inside of a bird's ear (above). A dinosaur's ear may have looked very similar. Sound entered the ear hole in the side of the dinosaur's head. It travelled down a short tube until it hit the ear drum. The sound waves made the ear drum vibrate. This movement set a small bone in the middle ear moving. It carried the vibrations to the inner ear, which was filled with a special liquid and lined with nerve endings. These nerves carried messages about the sound to the dinosaur's brain.

***Saurolophus* would have heard a wide range of squeaks, croaks and howls from the animals that shared its world.**

Dinosaurs in the flesh



The skin of this lifelike model of *Carnotaurus* (below) is based on well-preserved skin impressions.

The final stage of rebuilding a dinosaur brings us face to face with the animal it might have been millions of years ago.

Skin, eyes, claws and horns are clues to what a dinosaur looked like. Deciding what they were like can be difficult detective work for scientists.

CAPTURING CARNOTAURUS

Most skin fossils are tiny fragments. But in a few cases impressions of almost the whole body have survived. Large sections of skin impressions from the body and skull of *Carnotaurus* have been found. So scientists have been able to construct a very lifelike model of this large meat-eater.

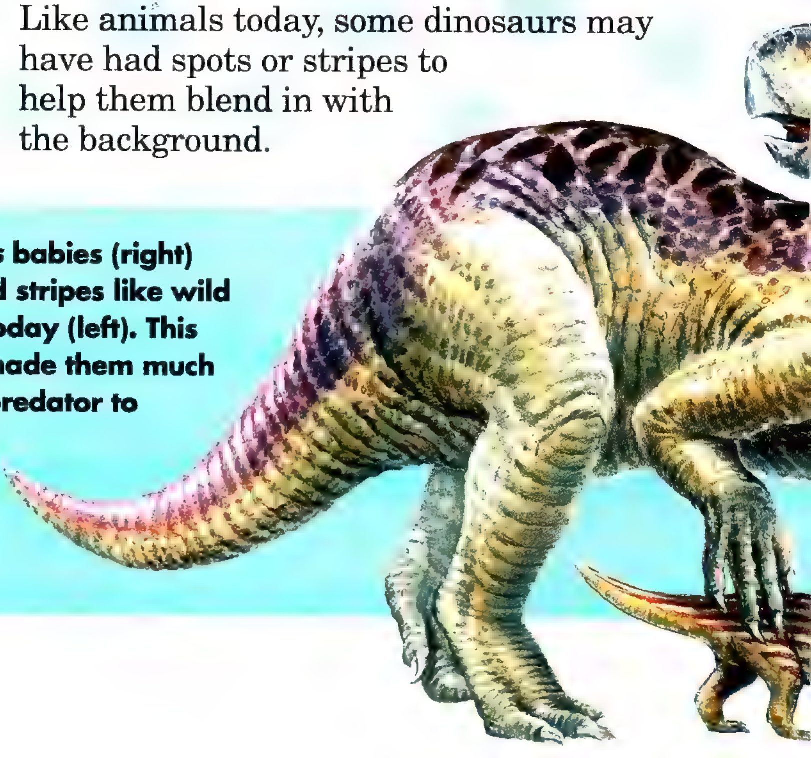
SKIN DEEP

Skin usually rots away quickly when an animal dies. But it can fossilize if it dries out very fast. When that happens it can leave a clear impression in the surrounding rock. Dinosaur skin impressions are rare, but they do exist. They show us that the skin was scaly, like a reptile's, or armour-plated for extra protection.

SPOTS OR STRIPES

No one is sure what colour dinosaur skin was. It is often shown as pale grey, green, or brown. But scientists now believe it could have been more brightly coloured. Like animals today, some dinosaurs may have had spots or stripes to help them blend in with the background.

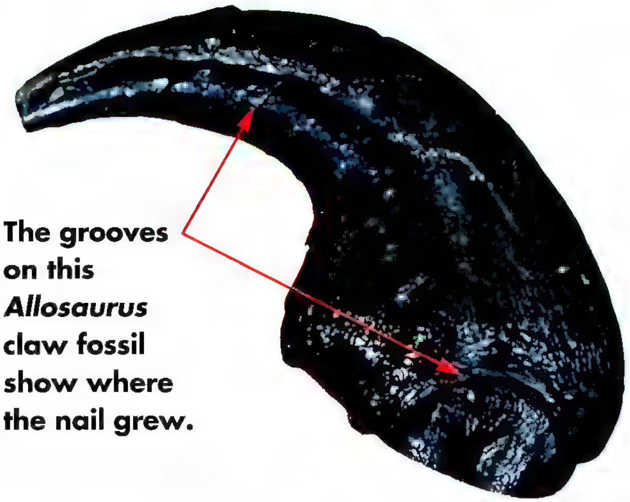
***Psittacosaurus* babies (right) may have had stripes like wild boar piglets today (left). This would have made them much harder for a predator to spot in a sun-splashed forest.**



EYE TO EYE

Fossils of bony eye sockets show us where a dinosaur's eyes were and how large they were. From these clues, scientists can work out how well a dinosaur could see. They can also guess how it might have behaved. An ostrich dinosaur had eyes that pointed forward, like a cat's. Animals with eyes in this position judge distances well. This helps them to catch their prey.

The eye sockets in *Troodon's* skull (left), show that it had large eyes and good eyesight.



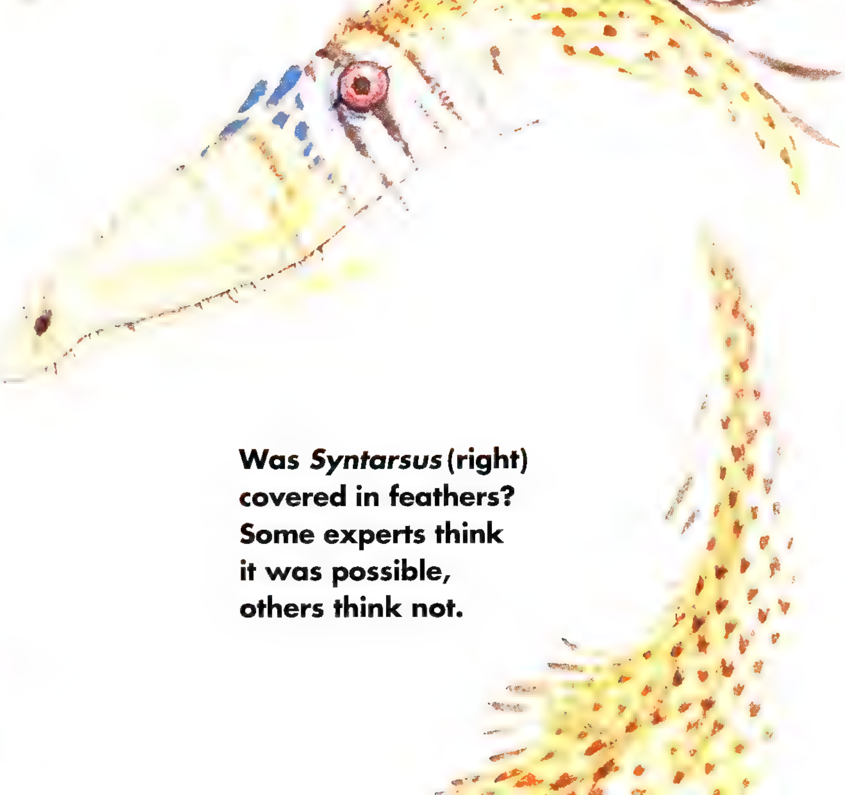
The grooves on this *Allosaurus* claw fossil show where the nail grew.

SCALES AND NAILS

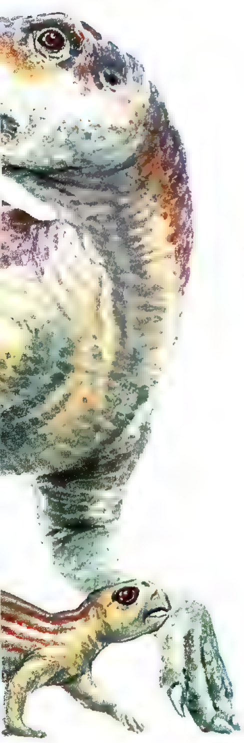
Looking at modern birds can give scientists clues about the final missing pieces when they are working on a dinosaur reconstruction. Experts think the scales and claw shapes of many of the two-legged dinosaurs may have been the same as those of an ostrich today. Tell-tale grooves on fossil claws show where a dinosaur's nails grew. Scientists can use this information to make their reconstructions as accurate and lifelike as possible.

FUR OR FEATHERS

No feathered dinosaur has been discovered. But some scientists believe that the small, speedy meat-eater *Syntarsus* might have had a plume of feathers on the back of its head. They also think that it could have had shorter feathers all over its body, just like a bird today. Other experts think that *Syntarsus* might even have been covered in fur.



Was *Syntarsus* (right) covered in feathers? Some experts think it was possible, others think not.



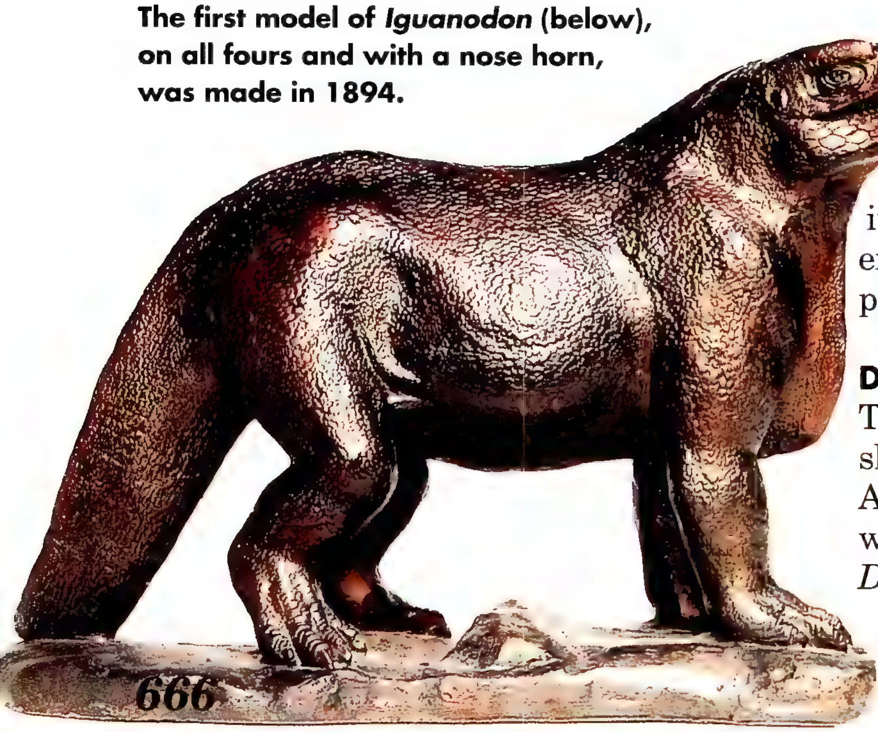
Making mistakes

Many mistakes were made when scientists first started putting dinosaur skeletons together.

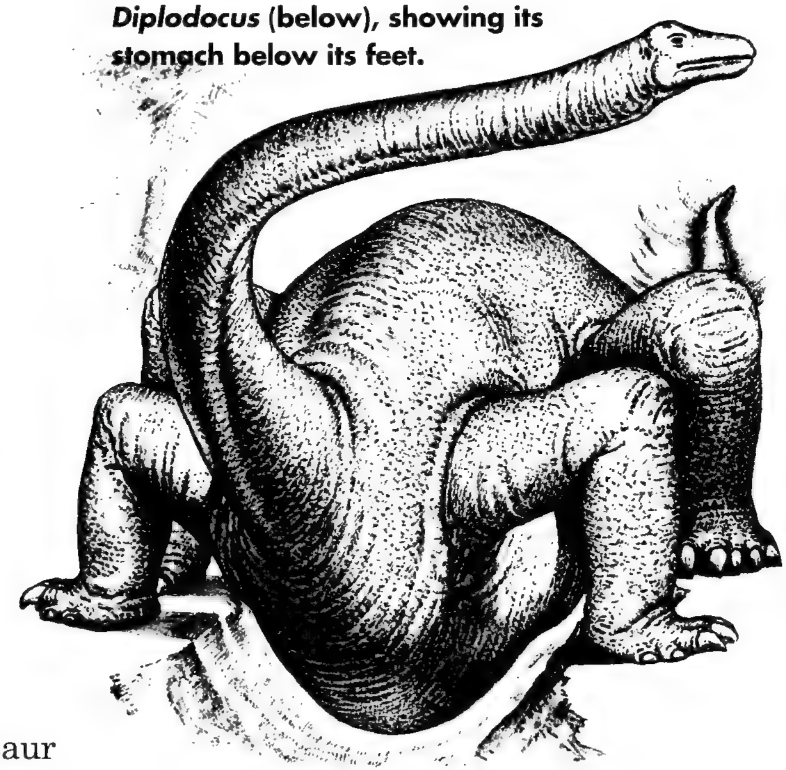
When the first dinosaur bones were found no one had ever seen a complete skeleton. They did not even know that dinosaurs existed. So it was very easy to make mistakes.

HORNED IGUANODON

One of the first people to discover dinosaur bones was an English doctor called Gideon Mantell. He found a collection of mysterious bones and teeth in 1820 and guessed that they belonged to a giant lizard. He named it *Iguanodon*. Dr Mantell drew *Iguanodon* crouched on all fours. He put its thumb spike on its nose because he thought it was a horn.



The first model of *Iguanodon* (below), on all fours and with a nose horn, was made in 1894.



An early impression of *Diplodocus* (below), showing its stomach below its feet.

THUMBS DOWN

Fifty-eight years later, when a huge collection of complete *Iguanodon* skeletons was found, scientists understood what the dinosaur really looked like. They realised that Mantell's horn should be a thumb. They also saw that *Iguanodon* must have walked on two legs some of the time.

LEGWORK

One early reconstruction of *Diplodocus* showed it standing with its legs out sideways like a lizard, and its stomach dragging on the ground. But experts later proved that it could not possibly have walked like that.

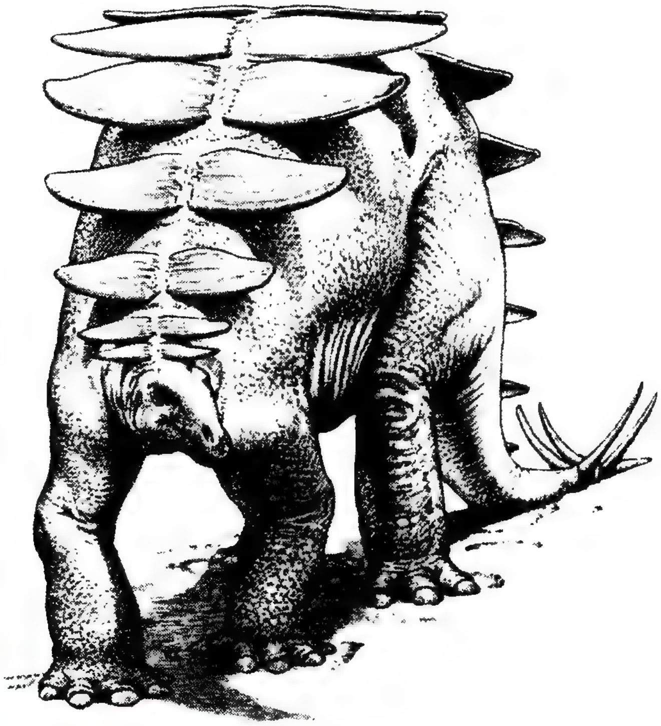
DIPLODOCUS IN A DITCH

They found that the shape of its leg bones showed that it must have stood upright. Also, its body was so deep that its stomach would have been below its feet. So *Diplodocus* would have needed a ditch for its stomach if it had sprawled along!

Is it true that *Diplodocus* had a trunk?

Some scientists think that *Diplodocus* must have had a trunk because it had high nostril openings, like an elephant. Most experts think this is very unlikely, however.

Some scientists have thought that *Stegosaurus'* armour-plates (below) lay flat along its back to protect it.



TELL-TAIL

Reconstructions of dinosaurs used to show their tails dragging along the ground. But experts now believe they were largely held up in the air. Ostrich dinosaurs used them for balance. The tails of the giant plant-eaters balanced their long necks as they moved. Some dinosaurs fought off predators by lashing out with their tails.

TREE-DWELLERS

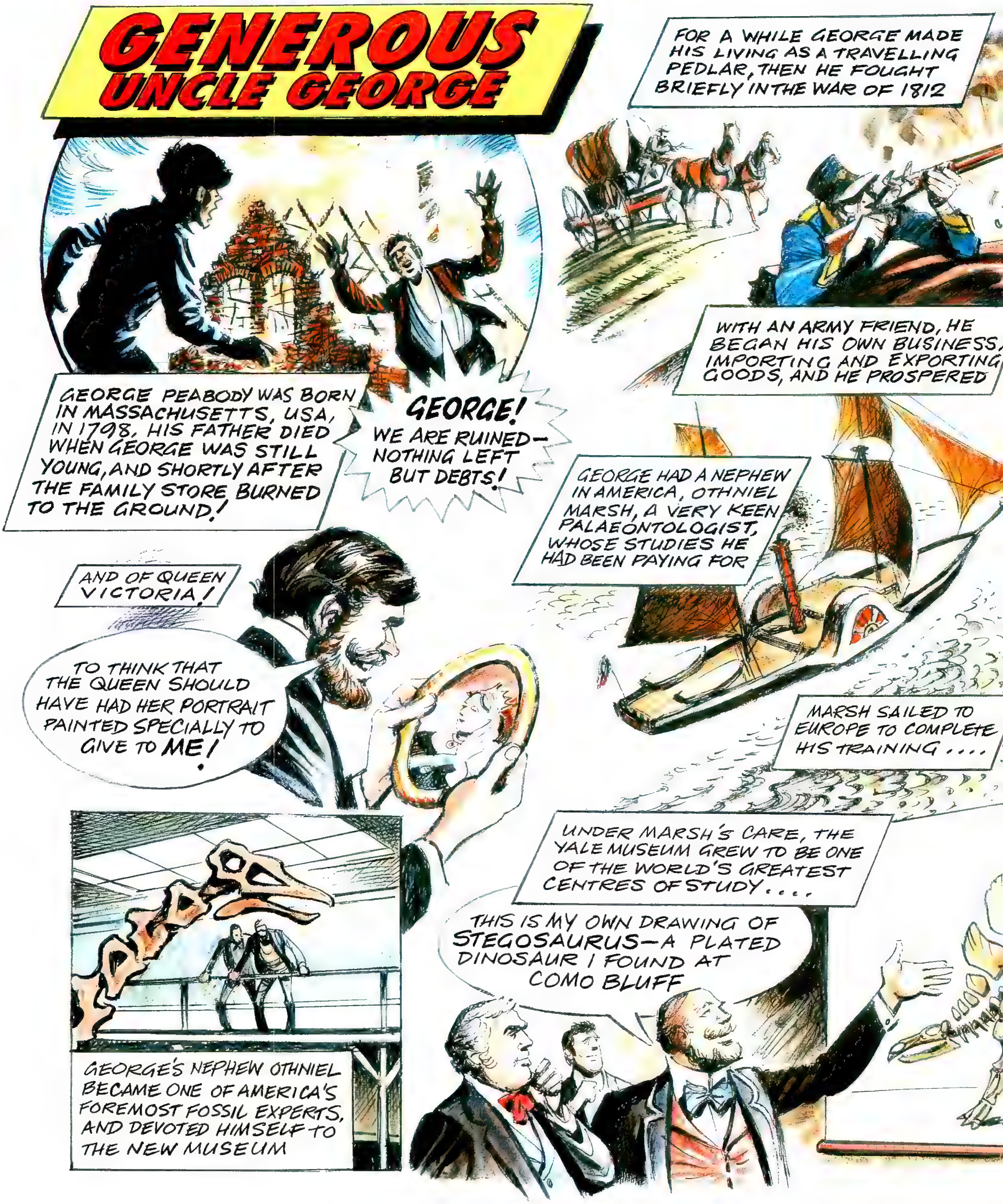
Scientists once thought *Hypsilophodon* lived in trees, and used its long tail for balance while clinging on with its sharp claws. Experts have now proved that it lived on the ground.

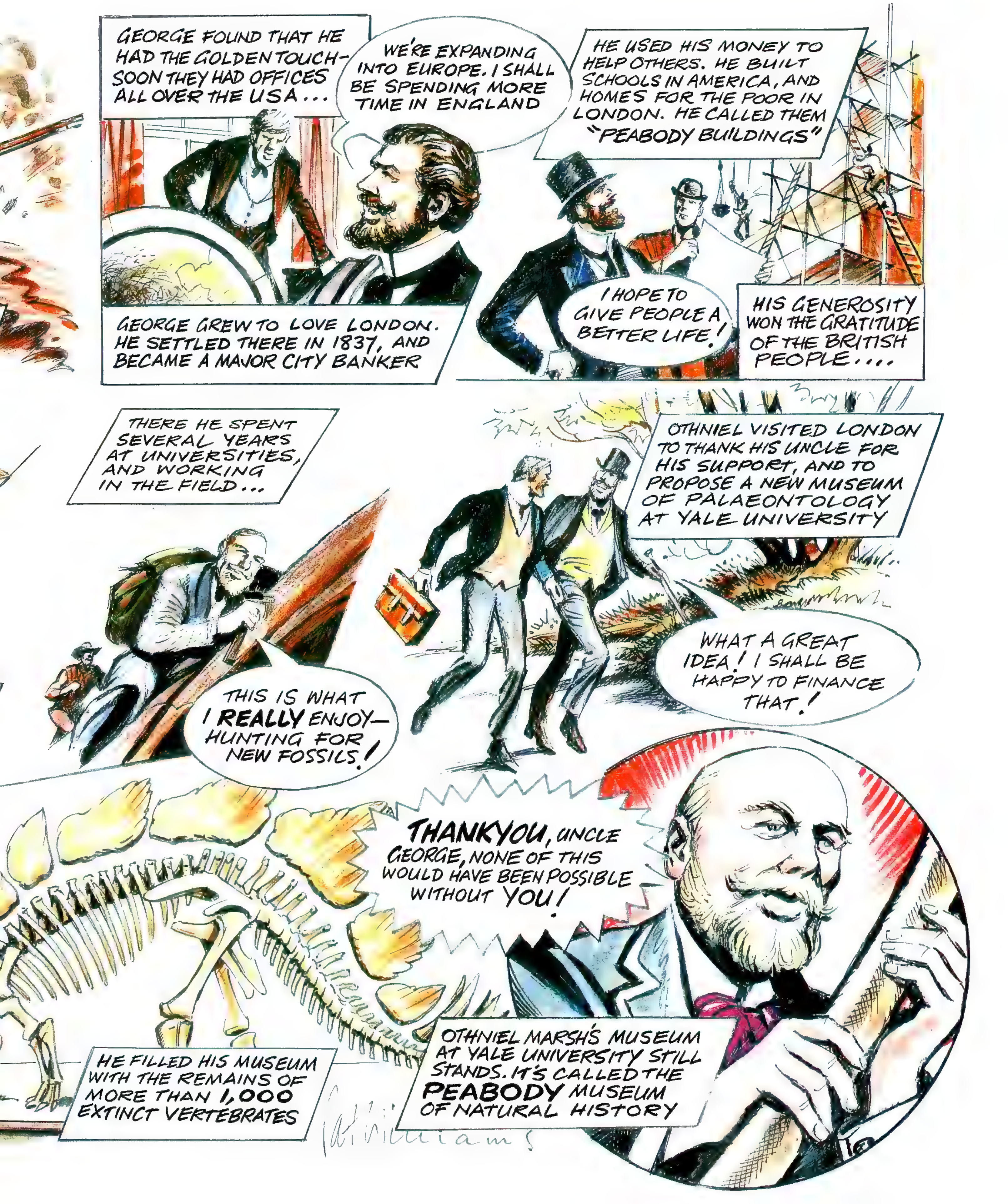
SOLVING THE PUZZLE

We now know much more about dinosaurs. But there are still many mysteries to solve. We will probably always make some mistakes as we will never know all the answers.

Hypsilophodon (above) was once thought to live in trees.

GENEROUS UNCLE GEORGE


GEORGE PEABODY WAS BORN IN MASSACHUSETTS, USA, IN 1798. HIS FATHER DIED WHEN GEORGE WAS STILL YOUNG, AND SHORTLY AFTER THE FAMILY STORE BURNED TO THE GROUND!
GEORGE! WE ARE RUINED— NOTHING LEFT BUT DEBTS!
FOR A WHILE GEORGE MADE HIS LIVING AS A TRAVELLING PEDLAR, THEN HE FOUGHT BRIEFLY IN THE WAR OF 1812
WITH AN ARMY FRIEND, HE BEGAN HIS OWN BUSINESS, IMPORTING AND EXPORTING GOODS, AND HE PROSPERED
GEORGE HAD A NEPHEW IN AMERICA, OTHNIEL MARSH, A VERY KEEN PALAEONTOLOGIST, WHOSE STUDIES HE HAD BEEN PAYING FOR
MARSH SAILED TO EUROPE TO COMPLETE HIS TRAINING....
AND OF QUEEN VICTORIA!
TO THINK THAT THE QUEEN SHOULD HAVE HAD HER PORTRAIT PAINTED SPECIALLY TO GIVE TO ME!
GEORGE'S NEPHEW OTHNIEL BECAME ONE OF AMERICA'S FOREMOST FOSSIL EXPERTS, AND DEVOTED HIMSELF TO THE NEW MUSEUM
UNDER MARSH'S CARE, THE YALE MUSEUM GREW TO BE ONE OF THE WORLD'S GREATEST CENTRES OF STUDY....
THIS IS MY OWN DRAWING OF STEGOSAURUS—A PLATED DINOSAUR I FOUND AT COMO BLUFF


GEORGE FOUND THAT HE HAD THE GOLDEN TOUCH – SOON THEY HAD OFFICES ALL OVER THE USA...
WE'RE EXPANDING INTO EUROPE. I SHALL BE SPENDING MORE TIME IN ENGLAND
GEORGE GREW TO LOVE LONDON. HE SETTLED THERE IN 1837, AND BECAME A MAJOR CITY BANKER
HE USED HIS MONEY TO HELP OTHERS. HE BUILT SCHOOLS IN AMERICA, AND HOMES FOR THE POOR IN LONDON. HE CALLED THEM "PEABODY BUILDINGS"
I HOPE TO GIVE PEOPLE A BETTER LIFE!
HIS GENEROSITY WON THE GRATITUDE OF THE BRITISH PEOPLE....
THERE HE SPENT SEVERAL YEARS AT UNIVERSITIES, AND WORKING IN THE FIELD...
THIS IS WHAT I REALLY ENJOY – HUNTING FOR NEW FOSSILS!
OTHNIEL VISITED LONDON TO THANK HIS UNCLE FOR HIS SUPPORT, AND TO PROPOSE A NEW MUSEUM OF PALAEONTOLOGY AT YALE UNIVERSITY
WHAT A GREAT IDEA! I SHALL BE HAPPY TO FINANCE THAT!
THANKYOU, UNCLE GEORGE, NONE OF THIS WOULD HAVE BEEN POSSIBLE WITHOUT YOU!
HE FILLED HIS MUSEUM WITH THE REMAINS OF MORE THAN 1,000 EXTINCT VERTEBRATES
OTHNIEL MARSH'S MUSEUM AT YALE UNIVERSITY STILL STANDS. IT'S CALLED THE PEABODY MUSEUM OF NATURAL HISTORY
Williams

Improve and test your knowledge with...

DINO Fact File

Triceratops holds all the answers. See how you score in the quiz.

1 The top of *Hypacrosaurus'* skull was shaped like
a) a baseball cap
b) a garden spade
c) a tennis racket

2 Where was *Titanosaurus* first found?
a) in Hungary
b) in Argentina
c) in India

3 Which of these statements is true?
a) *Staurikosaurus* lived in the Late Cretaceous
b) *Staurikosaurus* only ate plants
c) *Staurikosaurus* was a lightweight dinosaur

4 How long was *Maiasaura*?
a) 19m long
b) 1.9m long
c) 9m long

5 Most dinosaur eggs that have been found are from:
a) the Jurassic
b) the Triassic
c) the Late Cretaceous

Slow motion

Until recently, many experts believed that dinosaurs were slow, lumbering animals, which is how they were portrayed in early dinosaur films. Nowadays, as ideas change and new studies are carried out, experts agree that many dinosaurs could run as fast as some of today's animals.

So near and yet so far!

The small meat-eating dinosaurs Coelophysis (found in America) and Syntarsus (discovered in Zimbabwe, Africa) are so alike that some scientists think they may be the same species. What they are sure of is that during the Late Triassic these two continents were very close together. Today they are 10,000km, or a 12 hour plane trip, apart!

Rare eggs

Most of the dinosaur eggs found date from the Late Cretaceous. Experts are still puzzled about why Triassic and Jurassic eggs were so rare.

Tail lift

For 90 years, the huge Diplodocus skeleton, which stands proudly in the entrance to the British Museum, London, has rested its tail on the floor. Scientists now believe that Diplodocus walked with its tail straight out behind it. Today, visitors to the museum can see Diplodocus with its tail in the air.

6 Which of the following was an upland dinosaur?

a) *Diplodocus*
b) *Parasaurolophus*
c) *Anchisaurus*

7 What colour were dinosaurs?

a) they were all grey
b) no one really knows
c) they were all pink

8 Where were dinosaurs' ears?

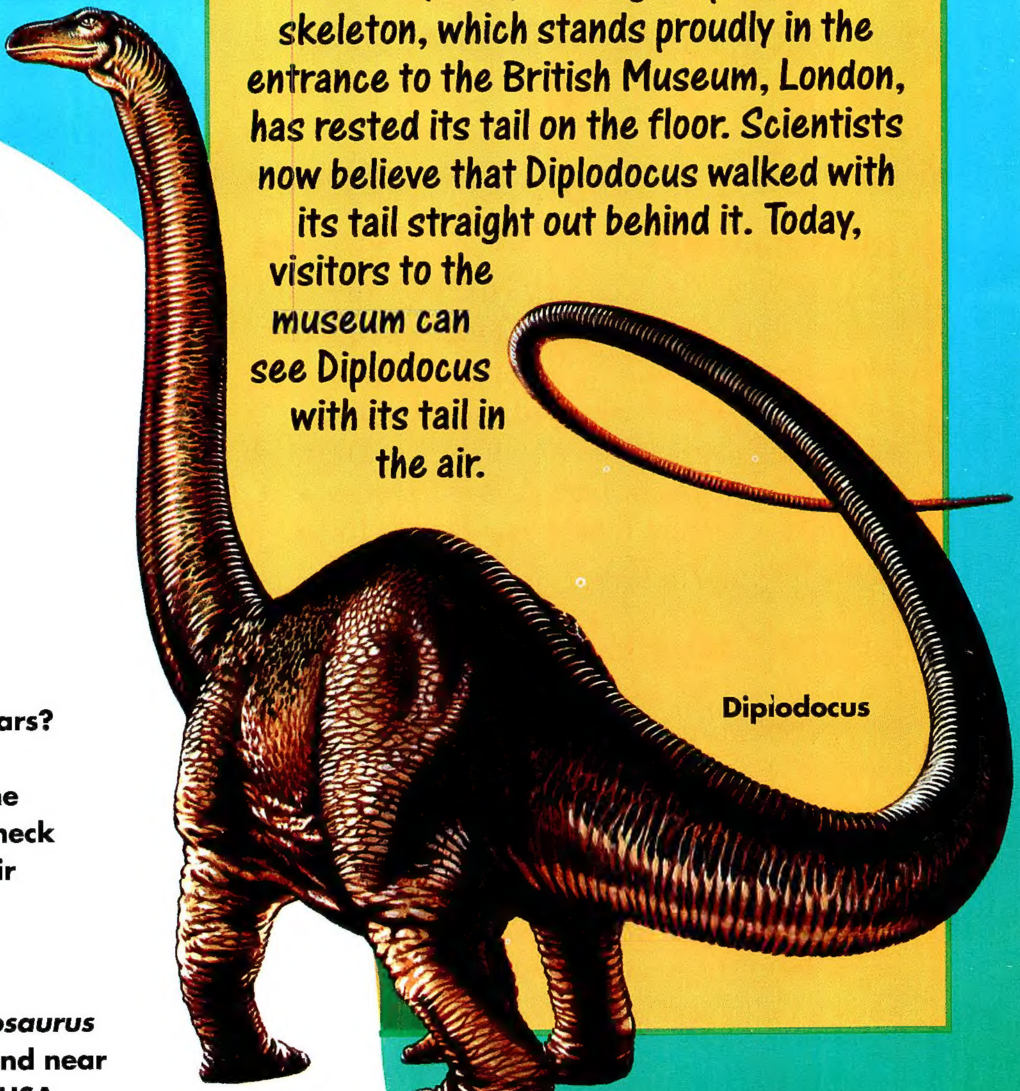
a) in their tails
b) close to where the head joined the neck
c) on the top of their heads

9 *Lycorhinus* means:

a) wolf snout
b) cat ears
c) dog foot

10 *Macrurosaurus* was found near

a) Cambridge, USA
b) Oxford, England
c) Cambridge, England



Diplodocus

Bigger and bigger

The very first ceratopians were quite small. As time passed, they got bigger! Protoceratops, an early ceratopian, was about the size of a large dog. Triceratops, which lived 20 million years later was as long as two cars.

Big and little

When Iguanodon skeletons were uncovered in Bernissart, Belgium, scientists found two different types of the same dinosaur. One, which was named Iguanodon bernissartensis, was much larger than the other – Iguanodon atherfieldensis. Scientists are still not sure whether they differed in size because they were different species, or whether the larger ones were male and the smaller ones were female.

Answers to the questions on inside back cover

LUKOUSAURUS **200 MYA**

Lukousaurus (loo-koo-saw-rus) was a small horned dinosaur, about 2m long. Its remains were found in Yunnan, southern China. *Lukousaurus* probably had a varied diet which included insects and lizards. It hunted prey on two slender legs. Above its eyes *Lukousaurus* had little brow horns. Its name means 'Lu-Kou reptile'.

LUSITANOSAURUS **190 MYA**

Only the upper jaw and some teeth remained of this armoured plant-eater when it was found in Portugal. *Lusitanosaurus* (loo-si-tan-o-saw-rus) was about 4m long. It walked slowly on four legs with the front half of its body sloping forwards. Bony studs protected its back and tail. *Lusitanosaurus* takes its name from the ancient province of Lusitania, known today as Portugal.

LYCORHINUS **200 MYA**

Like *Heterodontosaurus*, this small dinosaur ate plants and had several different sorts of teeth. *Lycorhinus* (lie-koe-rine-us) had sharp front teeth and grinding cheek teeth. Near the front of its jaw were two sharp, stabbing teeth which were probably used for digging, as well as for defence against predators. *Lycorhinus* was about the size of a small dog. Its name means 'wolf snout'.

M

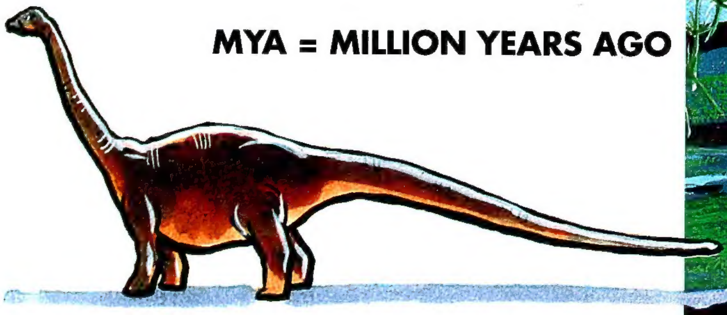
MACROPHALANGIA **80 MYA**

Macrophalangia (mak-ro-fal-an-gia) means 'large toes'. So it is not surprising that everything we know about this dinosaur is based on part of its foot. *Macrophalangia* had three long, slender toes and one short one. Each toe ended in a flat, pointed claw. *Macrophalangia* lived in Alberta, Canada, in the Late Cretaceous Period. Scientists think it had a deep head and a toothless beak, but no one is sure what it ate.

MACRUROSAURUS **130 MYA**

Macrurosaurus (ma-kroo-ro-saw-rus) was found near Cambridge, eastern England. The remains consisted of 40 tail bones. *Macrurosaurus* had a long tail and neck with a rather bulky body in between. Altogether it was as long as two rhinos. *Macrurosaurus* walked on four legs and ate plants. Its name means 'long tail reptile'.

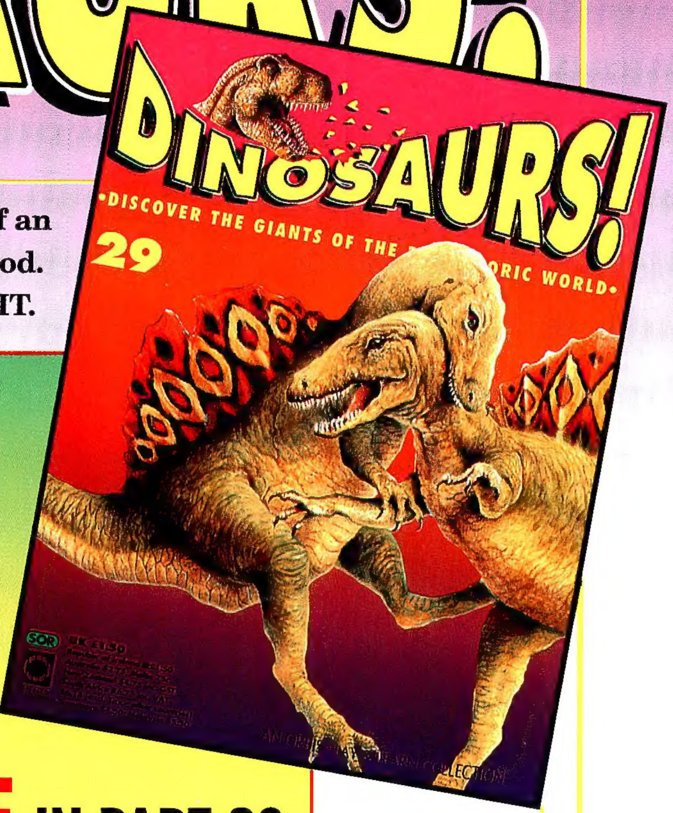
MYA = MILLION YEARS AGO

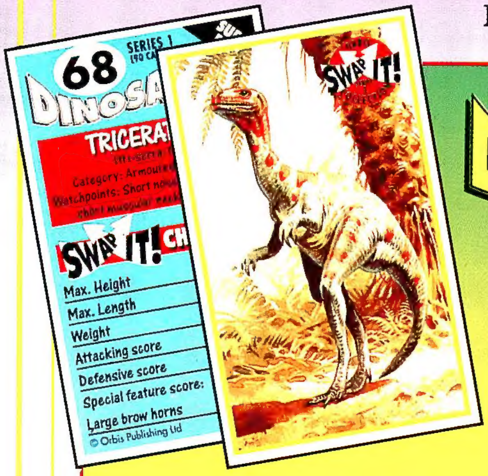


COMING IN PART 29 OF

DINOSAURS!

Baby *Mussaurus* could have fitted into the palm of an adult's hand. *Spinosaurus* was the longest theropod. Meet them both in IDENTIKIT.





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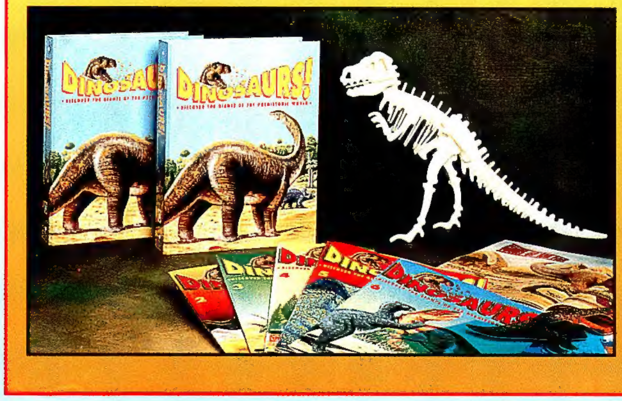

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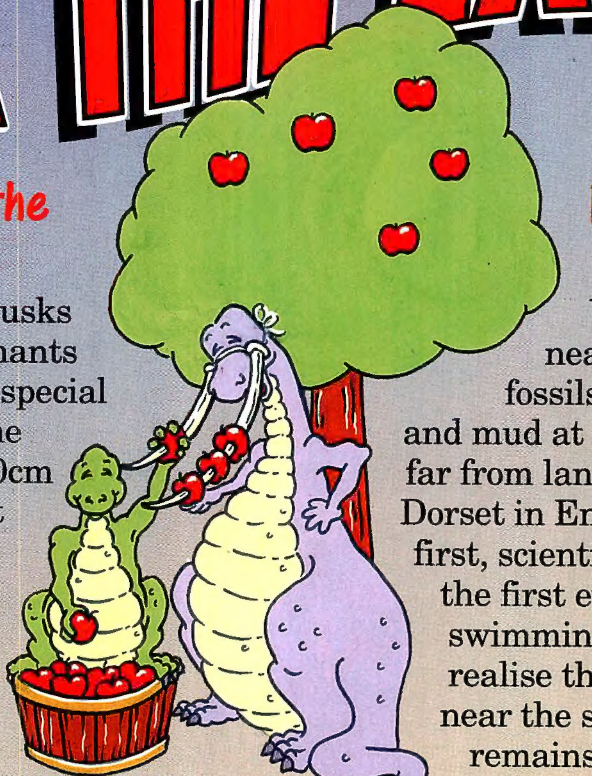
ANSWERS TO DINO FACT FILE QUESTIONS: 1.a 2.c 3.c 4.c 5.c 6.c 7.b 8.b 9.a 10.c

Dr. David Norman of Cambridge University answers your dinosaur questions

ASK THE EXPERT



Which dinosaur had the largest tusks?

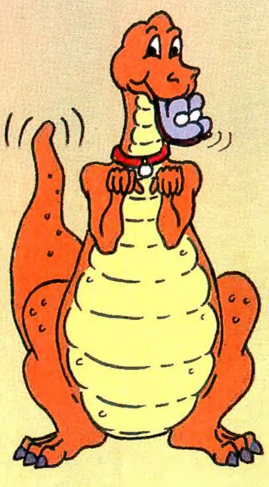
Very few dinosaurs had tusks like those of today's elephants and pigs. Tusks are very special long teeth. *T rex* had some very long teeth – up to 30cm long – but these were not tusks because they did not stand out as much bigger than all the rest. The best example of a dinosaur with tusks is *Heterodontosaurus*. It had tusks near the front of its jaws, and may have used them very much like pigs do today.

Did dinosaurs have tongues?

Yes, all dinosaurs had tongues. Inside the the throat at the base of the tongue is a group of bones. These bones anchor the muscles that move the tongue. In dinosaurs these bones are often well preserved and show that the tongue was large and powerful. Some dinosaurs may have had long tongues for grasping leaves – like the tongue of a cow – but scientists are not sure about this.

Did some dinosaurs live near the sea?

Yes, many dinosaurs lived near the sea. Some dinosaur fossils have been found in sand and mud at the bottom of the sea, not far from land. *Scelidosaurus* from Dorset in England is one example. At first, scientists thought that this was the first evidence of a true swimming dinosaur, but now we realise that this dinosaur lived near the sea, and when it died its remains were washed out to sea before they sank.



Would dinosaurs have made good pets if they were around today?

Most dinosaurs would have been too big to make good pets. However, there were a number of dinosaurs that were quite small. The little predatory ones, such as *Compsognathus*, which was about the size of a large cat, might have been manageable and intelligent pets. But dinosaurs were scaly creatures and I'm sure that they would not have been as cuddly as a cat!

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